Code No: RR410406 **RR** **Set No. 2**

IV B.Tech I Semester Examinations,December 2010
SATELLITE COMMUNICATIONS
Common to Electronics And Telematics, Electronics And Communication Engineering

Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

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1. (a) Define Noise figure. How the Noise figure can be converted into Noise temperature. [6]
   (b) An amplifier has a quoted noise figure of 2.5dB. What is its equivalent noise temperature. [4]
   (c) What is figure of merit, how it is expressed. What is its relationship to C/N ratio? [6]
2. (a) Draw the simplified diagram of large Earth station equipment using FDM/FM/FDMA technology and explain each block in detail. [10]
   (b) Explain the functions of major RF components used in the above Earth station design. [6]
3. Why lens antennas are preferred for satellite communication, explain in detail. Explain the function of lens antenna. [16]
4. (a) Prove that for covering the globe three communication satellites would be sufficient. [10]
   (b) Write a summary of U.S. expendable launch vehicles. [6]
5. (a) Describe in detail about various control signals generated when telemetry is done, with neat block diagram. [8]
   (b) Explain the action taken by command section when the satellite gives changes in attitude, orbit and tracking. [8]
6. Discuss how the average message delay time for TDMA is less than that for FDMA. Also discuss the practical benefits of such reduced delay in TDMA as function of frame time, for a satellite link with a one-way range of 36,000 km. For what values of frame time can there be a significant advantage of TDMA over FDMA. [16]
7. (a) A 14/11 GHz antenna has a G/T ratio of 40.3dB at 11.2 GHz. The antenna gain is 64dB and the system noise temperature at 10 deg elevation angle in clear air conditions is 234k. The antenna aperture efficiency and noise temperature are detailed in the list below. During heavy rain, the slant path attenuation reaches 8dB for 0.01 percent of the year. Calculate G/T ratio for their fraction of the year and the corresponding reduction in C/N for the received signal. [10]
   Aperture efficiency: 71.3%

Sky noise at 10deg elevation: 30k
LNA noise temperature: 150k

(b) Explain in detail how geostationary satellites are tracked from the earth station? [6]

8. Discuss the phenomena of eclipse as applied to geostationary satellite and solar interference experienced at an earth station. How do these factors influence the system design. [16]

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Code No: RR410406 **RR** **Set No. 4**

IV B.Tech I Semester Examinations,December 2010
SATELLITE COMMUNICATIONS
Common to Electronics And Telematics, Electronics And Communication Engineering

Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

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1. (a) Prove that for covering the globe three communication satellites would be sufficient. [10]
   (b) Write a summary of U.S. expendable launch vehicles. [6]
2. Discuss the phenomena of eclipse as applied to geostationary satellite and solar interference experienced at an earth station. How do these factors influence the system design. [16]
3. (a) Draw the simplified diagram of large Earth station equipment using FDM/FM/FDMA technology and explain each block in detail. [10]
   (b) Explain the functions of major RF components used in the above Earth station design. [6]
4. (a) Describe in detail about various control signals generated when telemetry is done, with neat block diagram. [8]
   (b) Explain the action taken by command section when the satellite gives changes in attitude, orbit and tracking. [8]
5. Discuss how the average message delay time for TDMA is less than that for FDMA. Also discuss the practical benefits of such reduced delay in TDMA as function of frame time, for a satellite link with a one-way range of 36,000 km. For what values of frame time can there be a significant advantage of TDMA over FDMA. [16]
6. (a) Define Noise figure. How the Noise figure can be converted into Noise temperature. [6]
   (b) An amplifier has a quoted noise figure of 2.5dB. What is its equivalent noise temperature. [4]
   (c) What is figure of merit, how it is expressed. What is its relationship to C/N ratio? [6]
7. Why lens antennas are preferred for satellite communication, explain in detail. Explain the function of lens antenna. [16]
8. (a) A 14/11 GHz antenna has a G/T ratio of 40.3dB at 11.2 GHz. The antenna gain is 64dB and the system noise temperature at 10 deg elevation angle in clear air conditions is 234k. The antenna aperture efficiency and noise temperature are detailed in the list below. During heavy rain, the slant path

attenuation reaches 8dB for 0.01 percent of the year. Calculate G/T ratio for their fraction of the year and the corresponding reduction in C/N for the received signal. [10]
Aperture efficiency: 71.3%
Sky noise at 10deg elevation: 30k
LNA noise temperature: 150k

(b) Explain in detail how geostationary satellites are tracked from the earth station? [6]

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Code No: RR410406 **RR** **Set No. 1**

IV B.Tech I Semester Examinations,December 2010
SATELLITE COMMUNICATIONS
Common to Electronics And Telematics, Electronics And Communication Engineering

Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

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1. (a) Draw the simplified diagram of large Earth station equipment using FDM/FM/FDMA technology and explain each block in detail. [10]
   (b) Explain the functions of major RF components used in the above Earth station design. [6]
2. Discuss how the average message delay time for TDMA is less than that for FDMA. Also discuss the practical benefits of such reduced delay in TDMA as function of frame time, for a satellite link with a one-way range of 36,000 km. For what values of frame time can there be a significant advantage of TDMA over FDMA. [16]
3. (a) Define Noise figure. How the Noise figure can be converted into Noise temperature. [6]
   (b) An amplifier has a quoted noise figure of 2.5dB. What is its equivalent noise temperature. [4]
   (c) What is figure of merit, how it is expressed. What is its relationship to C/N ratio? [6]
4. (a) A 14/11 GHz antenna has a G/T ratio of 40.3dB at 11.2 GHz. The antenna gain is 64dB and the system noise temperature at 10 deg elevation angle in clear air conditions is 234k. The antenna aperture efficiency and noise temperature are detailed in the list below. During heavy rain, the slant path attenuation reaches 8dB for 0.01 percent of the year. Calculate G/T ratio for their fraction of the year and the corresponding reduction in C/N for the received signal. [10]
   Aperture efficiency: 71.3%
   Sky noise at 10deg elevation: 30k
   LNA noise temperature: 150k
   (b) Explain in detail how geostationary satellites are tracked from the earth station? [6]
5. Why lens antennas are preferred for satellite communication, explain in detail. Explain the function of lens antenna. [16]
6. (a) Describe in detail about various control signals generated when telemetry is done, with neat block diagram. [8]
   (b) Explain the action taken by command section when the satellite gives changes in attitude, orbit and tracking. [8]

7. (a) Prove that for covering the globe three communication satellites would be sufficient. [10]

   (b) Write a summary of U.S. expendable launch vehicles. [6]

8. Discuss the phenomena of eclipse as applied to geostationary satellite and solar interference experienced at an earth station. How do these factors influence the system design. [16]

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Code No: RR410406 **RR** **Set No. 3**

IV B.Tech I Semester Examinations,December 2010
SATELLITE COMMUNICATIONS
Common to Electronics And Telematics, Electronics And Communication Engineering

Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

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1. (a) A 14/11 GHz antenna has a G/T ratio of 40.3dB at 11.2 GHz. The antenna gain is 64dB and the system noise temperature at 10 deg elevation angle in clear air conditions is 234k. The antenna aperture efficiency and noise temperature are detailed in the list below. During heavy rain, the slant path attenuation reaches 8dB for 0.01 percent of the year. Calculate G/T ratio for their fraction of the year and the corresponding reduction in C/N for the received signal. [10]
   Aperture efficiency: 71.3%
   Sky noise at 10deg elevation: 30k
   LNA noise temperature: 150k
   (b) Explain in detail how geostationary satellites are tracked from the earth station? [6]
2. Discuss how the average message delay time for TDMA is less than that for FDMA. Also discuss the practical benefits of such reduced delay in TDMA as function of frame time, for a satellite link with a one-way range of 36,000 km. For what values of frame time can there be a significant advantage of TDMA over FDMA. [16]
3. (a) Prove that for covering the globe three communication satellites would be sufficient. [10]
   (b) Write a summary of U.S. expendable launch vehicles. [6]
4. Discuss the phenomena of eclipse as applied to geostationary satellite and solar interference experienced at an earth station. How do these factors influence the system design. [16]
5. (a) Define Noise figure. How the Noise figure can be converted into Noise temperature. [6]
   (b) An amplifier has a quoted noise figure of 2.5dB. What is its equivalent noise temperature. [4]
   (c) What is figure of merit, how it is expressed. What is its relationship to C/N ratio? [6]
6. (a) Draw the simplified diagram of large Earth station equipment using FDM/FM/FDMA technology and explain each block in detail. [10]
   (b) Explain the functions of major RF components used in the above Earth station design. [6]

7. Why lens antennas are preferred for satellite communication, explain in detail. Explain the function of lens antenna. [16]

8. (a) Describe in detail about various control signals generated when telemetry is done, with neat block diagram. [8]

   (b) Explain the action taken by command section when the satellite gives changes in attitude, orbit and tracking. [8]

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